**Pace Analytical Services, Inc.**
9800 Kincey Ave. Suite 100
Huntersville, NC 28078
(704)875-9092

September 26, 2016

Meagan E. Ormand
Golder Associates Inc.
2108 W. Laburnum Ave.
Suite 200
Richmond, VA 23227

RE: Project: Bremo Weekly Process
Pace Project No.: 92313186

Dear Meagan Ormand:
Enclosed are the analytical results for sample(s) received by the laboratory on September 21, 2016. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

Analyses were performed at the Pace Analytical Services location indicated on the sample analyte page for analysis unless otherwise footnoted.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Nicole Gasiorowski
nicole.gasiorowski@pacelabs.com
Project Manager

Enclosures

cc: Ron DiFrancesco, Golder Associates Inc.
Martha Smith, Golder Associates Inc.
Mike Williams, Golder Associates Inc

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# CERTIFICATIONS

Project: Bremo Weekly Process
Pace Project No.: 92313186

**Ormond Beach Certification IDs**
8 East Tower Circle, Ormond Beach, FL 32174
Alabama Certification #: 41320
Connecticut Certification #: PH-0216
Delaware Certification: FL NELAC Reciprocity
Florida Certification #: E83079
Georgia Certification #: 955
Guam Certification: FL NELAC Reciprocity
Hawaii Certification: FL NELAC Reciprocity
Illinois Certification #: 200068
Indiana Certification: FL NELAC Reciprocity
Kansas Certification #: E-10383
Louisiana Certification #: FL NELAC Reciprocity
Louisiana Environmental Certificate #: 05007
Maryland Certification: #346
Michigan Certification #: 9911
Mississippi Certification: FL NELAC Reciprocity
Missouri Certification #: 236
Montana Certification #: Cert 0074
Nebraska Certification: NE-OS-28-14
Nevada Certification: FL NELAC Reciprocity
New York Certification #: 11608
North Carolina Environmental Certificate #: 667
North Carolina Certification #: 12710
North Dakota Certification #: R-216
Oklahoma Certification #: D9947
Pennsylvania Certification #: 68-00547
Puerto Rico Certification #: FL01264
South Carolina Certification: #96042001
Tennessee Certification #: TN02974
Texas Certification: FL NELAC Reciprocity
US Virgin Islands Certification: FL NELAC Reciprocity
Virginia Environmental Certification #: 460165
Wyoming Certification: FL NELAC Reciprocity
West Virginia Certification #: 9962C
Wisconsin Certification #: 399079670
Wyoming (EPA Region 8): FL NELAC Reciprocity

**Charlotte Certification IDs**
9800 Kincey Ave. Ste 100, Huntersville, NC 28078
North Carolina Drinking Water Certification #: 37706
North Carolina Field Services Certification #: 5342
North Carolina Wastewater Certification #: 12
South Carolina Certification #: 99006001
Florida/NELAP Certification #: E87627
Kentucky UST Certification #: 84
Virginia/VELAP Certification #: 460221

**Asheville Certification IDs**
2225 Riverside Drive, Asheville, NC 28804
Florida/NELAP Certification #: E87648
Massachusetts Certification #: M-NC030
North Carolina Drinking Water Certification #: 37712
North Carolina Wastewater Certification #: 40
South Carolina Certification #: 99030001
Virginia/VELAP Certification #: 460222

**Eden Certification IDs**
205 East Meadow Road Suite A, Eden, NC 27288
North Carolina Drinking Water Certification #: 37738
North Carolina Wastewater Certification #: 633
Virginia/VELAP Certification #: 460025

## REPORT OF LABORATORY ANALYSIS

**Pace Analytical Services, Inc.**
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## SAMPLE ANALYTE COUNT

Project: Bremo Weekly Process
Pace Project No.: 92313186

| Lab ID | Sample ID | Method | Analysts | Analytes Reported | Laboratory |
|---|---|---|---|---|---|
| **92313186001** | **T4-160920-1735-S3** | SM 2540D | KCE | 1 | PASI-E |
| | | EPA 350.1 1993 Rev 2.0 | KCE | 1 | PASI-E |
| | | SM 4500-Cl-E-2011 | KCE | 1 | PASI-E |
| | | EPA 1664B | JMS | 1 | PASI-C |
| | | EPA 200.7 | RVK | 1 | PASI-O |
| | | Trivalent Chromium Calculation | CKJ | 1 | PASI-O |
| | | EPA 200.8 | CKJ | 10 | PASI-O |
| | | EPA 245.1 | WAB | 1 | PASI-A |
| | | EPA 218.7 | AEM | 1 | PASI-O |

## REPORT OF LABORATORY ANALYSIS

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# PROJECT NARRATIVE

Project: Bremo Weekly Process
Pace Project No.: 92313186

**Method:** **SM 2540D**
**Description:** 2540D TSS, Low-Level, Eden
**Client:** Golder_Dominion_Bremo
**Date:** September 26, 2016

**General Information:**
1 sample was analyzed for SM 2540D. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

**Hold Time:**
The samples were analyzed within the method required hold times with any exceptions noted below.

**Method Blank:**
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

**Laboratory Control Spike:**
All laboratory control spike compounds were within QC limits with any exceptions noted below.

**Matrix Spikes:**
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

**Duplicate Sample:**
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

**Additional Comments:**

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# PROJECT NARRATIVE

Project: Bremo Weekly Process
Pace Project No.: 92313186

**Method:** **EPA 350.1 1993 Rev 2.0**
**Description:** 350.1 Ammonia
**Client:** Golder_Dominion_Bremo
**Date:** September 26, 2016

**General Information:**
1 sample was analyzed for EPA 350.1 1993 Rev 2.0. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

**Hold Time:**
The samples were analyzed within the method required hold times with any exceptions noted below.

**Method Blank:**
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

**Laboratory Control Spike:**
All laboratory control spike compounds were within QC limits with any exceptions noted below.

**Matrix Spikes:**
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

**Additional Comments:**

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# PROJECT NARRATIVE

Project: Bremo Weekly Process
Pace Project No.: 92313186

**Method:** **SM 4500-Cl-E-2011**
**Description:** 4500 Chloride
**Client:** Golder_Dominion_Bremo
**Date:** September 26, 2016

**General Information:**
1 sample was analyzed for SM 4500-Cl-E-2011. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

**Hold Time:**
The samples were analyzed within the method required hold times with any exceptions noted below.

**Method Blank:**
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

**Laboratory Control Spike:**
All laboratory control spike compounds were within QC limits with any exceptions noted below.

**Matrix Spikes:**
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

**Additional Comments:**

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# PROJECT NARRATIVE

Project: Bremo Weekly Process
Pace Project No.: 92313186

**Method:** **EPA 1664B**
**Description:** HEM, Oil and Grease
**Client:** Golder_Dominion_Bremo
**Date:** September 26, 2016

**General Information:**
1 sample was analyzed for EPA 1664B. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

**Hold Time:**
The samples were analyzed within the method required hold times with any exceptions noted below.

**Initial Calibrations (including MS Tune as applicable):**
All criteria were within method requirements with any exceptions noted below.

**Continuing Calibration:**
All criteria were within method requirements with any exceptions noted below.

**Surrogates:**
All surrogates were within QC limits with any exceptions noted below.

**Method Blank:**
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

**Laboratory Control Spike:**
All laboratory control spike compounds were within QC limits with any exceptions noted below.

**Matrix Spikes:**
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

**Additional Comments:**

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# PROJECT NARRATIVE

Project: Bremo Weekly Process
Pace Project No.: 92313186

**Method:** **EPA 200.7**
**Description:** 200.7 MET ICP
**Client:** Golder_Dominion_Bremo
**Date:** September 26, 2016

**General Information:**
1 sample was analyzed for EPA 200.7. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

**Hold Time:**
The samples were analyzed within the method required hold times with any exceptions noted below.

**Sample Preparation:**
The samples were prepared in accordance with EPA 200.7 with any exceptions noted below.

**Initial Calibrations (including MS Tune as applicable):**
All criteria were within method requirements with any exceptions noted below.

**Continuing Calibration:**
All criteria were within method requirements with any exceptions noted below.

**Method Blank:**
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

**Laboratory Control Spike:**
All laboratory control spike compounds were within QC limits with any exceptions noted below.

**Matrix Spikes:**
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

**Additional Comments:**

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# PROJECT NARRATIVE

Project: Bremo Weekly Process
Pace Project No.: 92313186

**Method:** **Trivalent Chromium Calculation**
**Description:** Trivalent Chromium Calculation
**Client:** Golder_Dominion_Bremo
**Date:** September 26, 2016

**General Information:**
1 sample was analyzed for Trivalent Chromium Calculation. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

**Hold Time:**
The samples were analyzed within the method required hold times with any exceptions noted below.

**Initial Calibrations (including MS Tune as applicable):**
All criteria were within method requirements with any exceptions noted below.

**Continuing Calibration:**
All criteria were within method requirements with any exceptions noted below.

**Method Blank:**
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

**Laboratory Control Spike:**
All laboratory control spike compounds were within QC limits with any exceptions noted below.

**Matrix Spikes:**
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

**Additional Comments:**

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# PROJECT NARRATIVE

Project: Bremo Weekly Process
Pace Project No.: 92313186

**Method:** **EPA 200.8**
**Description:** 200.8 MET ICPMS
**Client:** Golder_Dominion_Bremo
**Date:** September 26, 2016

**General Information:**
1 sample was analyzed for EPA 200.8. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

**Hold Time:**
The samples were analyzed within the method required hold times with any exceptions noted below.

**Sample Preparation:**
The samples were prepared in accordance with EPA 200.8 with any exceptions noted below.

**Initial Calibrations (including MS Tune as applicable):**
All criteria were within method requirements with any exceptions noted below.

**Continuing Calibration:**
All criteria were within method requirements with any exceptions noted below.

**Internal Standards:**
All internal standards were within QC limits with any exceptions noted below.

**Method Blank:**
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

**Laboratory Control Spike:**
All laboratory control spike compounds were within QC limits with any exceptions noted below.

**Matrix Spikes:**
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 322086

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 92313198001,92313198002

M1: Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

- MS (Lab ID: 1714588)
  - Antimony
  - Arsenic
- MSD (Lab ID: 1714589)
  - Antimony
  - Arsenic

**Additional Comments:**

## REPORT OF LABORATORY ANALYSIS

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# PROJECT NARRATIVE

Project: Bremo Weekly Process
Pace Project No.: 92313186

**Method:** **EPA 245.1**
**Description:** 245.1 Mercury
**Client:** Golder_Dominion_Bremo
**Date:** September 26, 2016

**General Information:**
1 sample was analyzed for EPA 245.1. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

**Hold Time:**
The samples were analyzed within the method required hold times with any exceptions noted below.

**Sample Preparation:**
The samples were prepared in accordance with EPA 245.1 with any exceptions noted below.

**Initial Calibrations (including MS Tune as applicable):**
All criteria were within method requirements with any exceptions noted below.

**Continuing Calibration:**
All criteria were within method requirements with any exceptions noted below.

**Method Blank:**
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

**Laboratory Control Spike:**
All laboratory control spike compounds were within QC limits with any exceptions noted below.

**Matrix Spikes:**
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

**Additional Comments:**

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# PROJECT NARRATIVE

Project: Bremo Weekly Process
Pace Project No.: 92313186

**Method:** **EPA 218.7**
**Description:** Hexavalent Chromium by IC
**Client:** Golder_Dominion_Bremo
**Date:** September 26, 2016

**General Information:**
1 sample was analyzed for EPA 218.7. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

**Hold Time:**
The samples were analyzed within the method required hold times with any exceptions noted below.

**Method Blank:**
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

**Laboratory Control Spike:**
All laboratory control spike compounds were within QC limits with any exceptions noted below.

**Matrix Spikes:**
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

**Additional Comments:**

This data package has been reviewed for quality and completeness and is approved for release.

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## ANALYTICAL RESULTS

Project: Bremo Weekly Process
Pace Project No.: 92313186

**Sample: T4-160920-1735-S3** **Lab ID: 92313186001** Collected: 09/20/16 17:35 Received: 09/21/16 13:30 Matrix: Water

| Parameters | Results | Units | Report Limit | DF | Prepared | Analyzed | CAS No. | Qual |
|---|---|---|---|---|---|---|---|---|
| **2540D TSS, Low-Level, Eden** | Analytical Method: SM 2540D | | | | | | | |
| Total Suspended Solids | ND | mg/L | 1.0 | 1 | | 09/22/16 10:30 | | |
| **350.1 Ammonia** | Analytical Method: EPA 350.1 1993 Rev 2.0 | | | | | | | |
| Nitrogen, Ammonia | ND | mg/L | 0.20 | 1 | | 09/22/16 14:10 | 7664-41-7 | |
| **4500 Chloride** | Analytical Method: SM 4500-Cl-E-2011 | | | | | | | |
| Chloride | **50.9** | mg/L | 5.0 | 5 | | 09/22/16 10:39 | 16887-00-6 | |
| **Field Data** | Analytical Method: | | | | | | | |
| Collected By | **L. Hamelman** | | | 1 | | 09/20/16 17:42 | | |
| Collected Date | **09/20/16** | | | 1 | | 09/20/16 17:42 | | |
| Collected Time | **17:35** | | | 1 | | 09/20/16 17:42 | | |
| Field pH | **7.9** | Std. Units | 0.10 | 1 | | 09/20/16 17:42 | | |
| **HEM, Oil and Grease** | Analytical Method: EPA 1664B | | | | | | | |
| Oil and Grease | ND | mg/L | 5.0 | 1 | | 09/22/16 07:55 | | |
| **200.7 MET ICP** | Analytical Method: EPA 200.7 Preparation Method: EPA 200.7 | | | | | | | |
| Tot Hardness asCaCO3 (SM 2340B | **180000** | ug/L | 3300 | 1 | 09/22/16 12:50 | 09/22/16 16:23 | | |
| **Trivalent Chromium Calculation** | Analytical Method: Trivalent Chromium Calculation | | | | | | | |
| Chromium, Trivalent | ND | ug/L | 5.0 | 1 | | 09/22/16 17:12 | 16065-83-1 | |
| **200.8 MET ICPMS** | Analytical Method: EPA 200.8 Preparation Method: EPA 200.8 | | | | | | | |
| Antimony | ND | ug/L | 5.0 | 1 | 09/22/16 12:50 | 09/22/16 16:33 | 7440-36-0 | |
| Arsenic | **50.5** | ug/L | 5.0 | 1 | 09/22/16 12:50 | 09/22/16 16:33 | 7440-38-2 | |
| Cadmium | ND | ug/L | 1.0 | 1 | 09/22/16 12:50 | 09/22/16 16:33 | 7440-43-9 | |
| Copper | ND | ug/L | 5.0 | 1 | 09/22/16 12:50 | 09/22/16 16:33 | 7440-50-8 | |
| Lead | ND | ug/L | 5.0 | 1 | 09/22/16 12:50 | 09/22/16 16:33 | 7439-92-1 | |
| Nickel | ND | ug/L | 5.0 | 1 | 09/22/16 12:50 | 09/22/16 16:33 | 7440-02-0 | |
| Selenium | ND | ug/L | 5.0 | 1 | 09/22/16 12:50 | 09/22/16 16:33 | 7782-49-2 | |
| Silver | ND | ug/L | 0.40 | 1 | 09/22/16 12:50 | 09/22/16 16:33 | 7440-22-4 | |
| Thallium | ND | ug/L | 1.0 | 1 | 09/22/16 12:50 | 09/22/16 16:33 | 7440-28-0 | |
| Zinc | ND | ug/L | 25.0 | 1 | 09/22/16 12:50 | 09/22/16 16:33 | 7440-66-6 | |
| **245.1 Mercury** | Analytical Method: EPA 245.1 Preparation Method: EPA 245.1 | | | | | | | |
| Mercury | ND | ug/L | 0.10 | 1 | 09/22/16 10:50 | 09/22/16 14:18 | 7439-97-6 | |
| **Hexavalent Chromium by IC** | Analytical Method: EPA 218.7 | | | | | | | |
| Chromium, Hexavalent | ND | ug/L | 1.0 | 1 | | 09/22/16 14:45 | 18540-29-9 | |

## REPORT OF LABORATORY ANALYSIS

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## QUALITY CONTROL DATA

Project: Bremo Weekly Process
Pace Project No.: 92313186

QC Batch: 329818 | Analysis Method: SM 2540D
QC Batch Method: SM 2540D | Analysis Description: 2540D TSS, Low Level, Eden
Associated Lab Samples: 92313186001

METHOD BLANK: 1827447 | Matrix: Water
Associated Lab Samples: 92313186001

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Total Suspended Solids | mg/L | ND | 1.0 | 09/22/16 10:27 | |

LABORATORY CONTROL SAMPLE: 1827448

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Total Suspended Solids | mg/L | 250 | 250 | 100 | 90-110 | |

SAMPLE DUPLICATE: 1827449

| Parameter | Units | 92313206001 Result | Dup Result | RPD | Qualifiers |
|---|---|---|---|---|---|
| Total Suspended Solids | mg/L | ND | ND | | |

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## REPORT OF LABORATORY ANALYSIS

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## QUALITY CONTROL DATA

Project: Bremo Weekly Process
Pace Project No.: 92313186

QC Batch: 329821 Analysis Method: EPA 350.1 1993 Rev 2.0
QC Batch Method: EPA 350.1 1993 Rev 2.0 Analysis Description: 350.1 Ammonia, EDEN
Associated Lab Samples: 92313186001

METHOD BLANK: 1827461 Matrix: Water
Associated Lab Samples: 92313186001

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Nitrogen, Ammonia | mg/L | ND | 0.20 | 09/22/16 14:01 | |

LABORATORY CONTROL SAMPLE: 1827462

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Nitrogen, Ammonia | mg/L | 5 | 5.1 | 103 | 90-110 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1827463 1827464

| Parameter | Units | 92313206002 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Nitrogen, Ammonia | mg/L | ND | 5 | 5 | 4.7 | 4.8 | 93 | 94 | 90-110 | 2 | |

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## QUALITY CONTROL DATA

Project: Bremo Weekly Process
Pace Project No.: 92313186

QC Batch: 329796 | Analysis Method: SM 4500-Cl-E-2011
QC Batch Method: SM 4500-Cl-E-2011 | Analysis Description: 4500 Chloride, EDEN
Associated Lab Samples: 92313186001

METHOD BLANK: 1827389 | Matrix: Water
Associated Lab Samples: 92313186001

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Chloride | mg/L | ND | 1.0 | 09/22/16 10:30 | |

LABORATORY CONTROL SAMPLE: 1827390

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Chloride | mg/L | 10 | 10.0 | 100 | 90-110 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1827391 1827392

| Parameter | Units | 92313206002 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Chloride | mg/L | ND | 10 | 10 | 10.9 | 9.9 | 109 | 99 | 90-110 | 10 | |

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## REPORT OF LABORATORY ANALYSIS

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## QUALITY CONTROL DATA

Project: Bremo Weekly Process
Pace Project No.: 92313186

QC Batch: 329770 Analysis Method: EPA 1664B
QC Batch Method: EPA 1664B Analysis Description: 1664 HEM, Oil and Grease
Associated Lab Samples: 92313186001

METHOD BLANK: 1827297 Matrix: Water
Associated Lab Samples: 92313186001

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Oil and Grease | mg/L | ND | 5.0 | 09/22/16 07:44 | |

LABORATORY CONTROL SAMPLE: 1827298

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Oil and Grease | mg/L | 40 | 35.1 | 88 | 78-114 | |

MATRIX SPIKE SAMPLE: 1827299

| Parameter | Units | 92313151001 Result | Spike Conc. | MS Result | MS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|---|
| Oil and Grease | mg/L | ND | 40 | 36.5 | 91 | 78-114 | |

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## REPORT OF LABORATORY ANALYSIS

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## QUALITY CONTROL DATA

Project: Bremo Weekly Process
Pace Project No.: 92313186

QC Batch: 329813 Analysis Method: EPA 245.1
QC Batch Method: EPA 245.1 Analysis Description: 245.1 Mercury
Associated Lab Samples: 92313186001

METHOD BLANK: 1827435 Matrix: Water
Associated Lab Samples: 92313186001

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Mercury | ug/L | ND | 0.10 | 09/22/16 14:03 | |

LABORATORY CONTROL SAMPLE: 1827436

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Mercury | ug/L | 2.5 | 2.6 | 104 | 85-115 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1827437 1827438

| Parameter | Units | 92313206001 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mercury | ug/L | ND | 2.5 | 2.5 | 2.4 | 2.3 | 95 | 93 | 70-130 | 3 | |

**Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.**

## REPORT OF LABORATORY ANALYSIS

**Pace Analytical Services, Inc.**
9800 Kincey Ave. Suite 100
Huntersville, NC 28078
(704)875-9092

## QUALITY CONTROL DATA

Project: Bremo Weekly Process
Pace Project No.: 92313186

QC Batch: 322085 Analysis Method: EPA 200.7
QC Batch Method: EPA 200.7 Analysis Description: 200.7 MET
Associated Lab Samples: 92313186001

METHOD BLANK: 1714580 Matrix: Water
Associated Lab Samples: 92313186001

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Tot Hardness asCaCO3 (SM 2340B | ug/L | ND | 3300 | 09/22/16 16:55 | |

LABORATORY CONTROL SAMPLE: 1714581

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Tot Hardness asCaCO3 (SM 2340B | ug/L | 82700 | 89500 | 108 | 85-115 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1714582 1714583

| Parameter | Units | 92313186001 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Tot Hardness asCaCO3 (SM 2340B | ug/L | 180000 | 82700 | 82700 | 265000 | 272000 | 103 | 112 | 70-130 | 3 | |

**Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.**

## REPORT OF LABORATORY ANALYSIS

**Pace Analytical Services, Inc.**
9800 Kincey Ave. Suite 100
Huntersville, NC 28078
(704)875-9092

## QUALITY CONTROL DATA

Project: Bremo Weekly Process
Pace Project No.: 92313186

QC Batch: 322086 Analysis Method: EPA 200.8
QC Batch Method: EPA 200.8 Analysis Description: 200.8 MET
Associated Lab Samples: 92313186001

METHOD BLANK: 1714584 Matrix: Water
Associated Lab Samples: 92313186001

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Antimony | ug/L | ND | 5.0 | 09/22/16 16:19 | |
| Arsenic | ug/L | ND | 5.0 | 09/22/16 16:19 | |
| Cadmium | ug/L | ND | 1.0 | 09/22/16 16:19 | |
| Copper | ug/L | ND | 5.0 | 09/22/16 16:19 | |
| Lead | ug/L | ND | 5.0 | 09/22/16 16:19 | |
| Nickel | ug/L | ND | 5.0 | 09/22/16 16:19 | |
| Selenium | ug/L | ND | 5.0 | 09/22/16 16:19 | |
| Silver | ug/L | ND | 0.40 | 09/22/16 16:19 | |
| Thallium | ug/L | ND | 1.0 | 09/22/16 16:19 | |
| Zinc | ug/L | ND | 25.0 | 09/22/16 16:19 | |

LABORATORY CONTROL SAMPLE: 1714585

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Antimony | ug/L | 50 | 48.2 | 96 | 85-115 | |
| Arsenic | ug/L | 50 | 49.4 | 99 | 85-115 | |
| Cadmium | ug/L | 5 | 4.9 | 97 | 85-115 | |
| Copper | ug/L | 50 | 53.8 | 108 | 85-115 | |
| Lead | ug/L | 50 | 48.9 | 98 | 85-115 | |
| Nickel | ug/L | 50 | 53.8 | 108 | 85-115 | |
| Selenium | ug/L | 50 | 48.7 | 97 | 85-115 | |
| Silver | ug/L | 5 | 5.0 | 100 | 85-115 | |
| Thallium | ug/L | 50 | 47.8 | 96 | 85-115 | |
| Zinc | ug/L | 250 | 261 | 105 | 85-115 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1714586 1714587

| Parameter | Units | 92313198001 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Antimony | ug/L | 3.7J | 50 | 50 | 51.1 | 51.2 | 95 | 95 | 70-130 | 0 | |
| Arsenic | ug/L | 62.8 | 50 | 50 | 112 | 111 | 98 | 96 | 70-130 | 1 | |
| Cadmium | ug/L | ND | 5 | 5 | 4.7 | 4.7 | 93 | 93 | 70-130 | 0 | |
| Copper | ug/L | ND | 50 | 50 | 47.8 | 48.6 | 95 | 97 | 70-130 | 2 | |
| Lead | ug/L | ND | 50 | 50 | 50.6 | 50.8 | 101 | 101 | 70-130 | 0 | |
| Nickel | ug/L | 8.1 | 50 | 50 | 56.4 | 57.1 | 97 | 98 | 70-130 | 1 | |
| Selenium | ug/L | 0.60J | 50 | 50 | 46.5 | 47.0 | 92 | 93 | 70-130 | 1 | |
| Silver | ug/L | ND | 5 | 5 | 4.7 | 4.7 | 94 | 94 | 70-130 | 1 | |
| Thallium | ug/L | 0.28J | 50 | 50 | 50.4 | 50.8 | 100 | 101 | 70-130 | 1 | |

**Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.**

## REPORT OF LABORATORY ANALYSIS

**Pace Analytical Services, Inc.**
9800 Kincey Ave. Suite 100
Huntersville, NC 28078
(704)875-9092

## QUALITY CONTROL DATA

Project: Bremo Weekly Process
Pace Project No.: 92313186

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1714586 1714587

| Parameter | Units | 92313198001 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Zinc | ug/L | 3.8J | 250 | 250 | 232 | 237 | 91 | 93 | 70-130 | 2 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1714588 1714589

| Parameter | Units | 92313198002 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Antimony | ug/L | 22.6 | 50 | 50 | 51.0 | 51.4 | 57 | 58 | 70-130 | 1 | M1 |
| Arsenic | ug/L | 379 | 50 | 50 | 51.2 | 52.1 | -655 | -654 | 70-130 | 2 | M1 |
| Cadmium | ug/L | 0.18J | 5 | 5 | 5.1 | 5.0 | 99 | 97 | 70-130 | 1 | |
| Copper | ug/L | 1.1J | 50 | 50 | 64.4 | 65.8 | 127 | 129 | 70-130 | 2 | |
| Lead | ug/L | ND | 50 | 50 | 51.2 | 51.8 | 102 | 103 | 70-130 | 1 | |
| Nickel | ug/L | 7.2 | 50 | 50 | 56.9 | 59.0 | 99 | 103 | 70-130 | 4 | |
| Selenium | ug/L | 9.0 | 50 | 50 | 48.7 | 49.8 | 79 | 82 | 70-130 | 2 | |
| Silver | ug/L | ND | 5 | 5 | 5.2 | 5.3 | 104 | 105 | 70-130 | 1 | |
| Thallium | ug/L | 0.97J | 50 | 50 | 49.7 | 50.2 | 97 | 98 | 70-130 | 1 | |
| Zinc | ug/L | 3.1J | 250 | 250 | 304 | 312 | 120 | 124 | 70-130 | 3 | |

**Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.**

## REPORT OF LABORATORY ANALYSIS

**Pace Analytical Services, Inc.**
9800 Kincey Ave. Suite 100
Huntersville, NC 28078
(704)875-9092

## QUALITY CONTROL DATA

Project: Bremo Weekly Process
Pace Project No.: 92313186

QC Batch: 322080 | Analysis Method: EPA 218.7
QC Batch Method: EPA 218.7 | Analysis Description: Chromium, Hexavalent IC
Associated Lab Samples: 92313186001

METHOD BLANK: 1714553 | Matrix: Water
Associated Lab Samples: 92313186001

| Parameter | Units | Blank Result | Reporting Limit | Analyzed | Qualifiers |
|---|---|---|---|---|---|
| Chromium, Hexavalent | ug/L | ND | 1.0 | 09/22/16 13:26 | |

LABORATORY CONTROL SAMPLE: 1714554

| Parameter | Units | Spike Conc. | LCS Result | LCS % Rec | % Rec Limits | Qualifiers |
|---|---|---|---|---|---|---|
| Chromium, Hexavalent | ug/L | .075 | .075J | 100 | 85-115 | |

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1714555 1714556

| Parameter | Units | 92312596036 Result | MS Spike Conc. | MSD Spike Conc. | MS Result | MSD Result | MS % Rec | MSD % Rec | % Rec Limits | RPD | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Chromium, Hexavalent | ug/L | 0.71 | .38 | .38 | 1.1J | 1.1J | 103 | 105 | 85-115 | 1 | |

**Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.**

## REPORT OF LABORATORY ANALYSIS

**Pace Analytical Services, Inc.**
9800 Kincey Ave. Suite 100
Huntersville, NC 28078
(704)875-9092

# QUALIFIERS

Project: Bremo Weekly Process
Pace Project No.: 92313186

## DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

Acid preservation may not be appropriate for 2 Chloroethylvinyl ether.

A separate vial preserved to a pH of 4-5 is recommended in SW846 Chapter 4 for the analysis of Acrolein and Acrylonitrile by EPA Method 8260.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

## LABORATORIES

| | |
|---|---|
| PASI-A | Pace Analytical Services - Asheville |
| PASI-C | Pace Analytical Services - Charlotte |
| PASI-E | Pace Analytical Services - Eden |
| PASI-O | Pace Analytical Services - Ormond Beach |

## ANALYTE QUALIFIERS

| | |
|---|---|
| M1 | Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery. |

**Pace Analytical Services, Inc.**
9800 Kincey Ave. Suite 100
Huntersville, NC 28078
(704)875-9092

## QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Bremo Weekly Process
Pace Project No.: 92313186

| Lab ID | Sample ID | QC Batch Method | QC Batch | Analytical Method | Analytical Batch |
|---|---|---|---|---|---|
| **92313186001** | **T4-160920-1735-S3** | SM 2540D | 329818 | | |
| **92313186001** | **T4-160920-1735-S3** | EPA 350.1 1993 Rev 2.0 | 329821 | | |
| **92313186001** | **T4-160920-1735-S3** | SM 4500-Cl-E-2011 | 329796 | | |
| **92313186001** | **T4-160920-1735-S3** | | | | |
| **92313186001** | **T4-160920-1735-S3** | EPA 1664B | 329770 | | |
| **92313186001** | **T4-160920-1735-S3** | EPA 200.7 | 322085 | EPA 200.7 | 322135 |
| **92313186001** | **T4-160920-1735-S3** | Trivalent Chromium Calculation | 322151 | | |
| **92313186001** | **T4-160920-1735-S3** | EPA 200.8 | 322086 | EPA 200.8 | 322134 |
| **92313186001** | **T4-160920-1735-S3** | EPA 245.1 | 329813 | EPA 245.1 | 329837 |
| **92313186001** | **T4-160920-1735-S3** | EPA 218.7 | 322080 | | |

| Pace Analytical | Document Name: Sample Condition Upon Receipt(SCUR) | Document Revised: May 24, 2016 Page 1 of 2 |
|---|---|---|
| | Document No.: F-MEC-CS-009-Rev.03 | Issuing Authority: Pace Mechanicsville Quality Office |



**Sample Condition Upon Receipt**

**Client Name:** Golder/Bremo

**Project #:** WO# : 92313186

92313186

**Courier:** ☐ Commercial ☐ Fed Ex ☐ UPS ☐ USPS ☐ Client ☑ Pace ☐ Other:____

**Custody Seal Present?** ☑ Yes ☐ No **Seals Intact?** ☑ Yes ☐ No

**Date/Initials Person Examining Contents:** 9-21-16 RSB

**Packing Material:** ☐ Bubble Wrap ☑ Bubble Bags ☐ None ☐ Other:____

**Thermometer:** ☒ RMD001 ☐ ____ **Type of Ice:** ☑ Wet ☐ Blue ☐ None ☐ Samples on ice, cooling process has begun

**Correction Factor: 0.0°C** **Cooler Temp Corrected (°C):** 3.6 **Biological Tissue Frozen?** ☐ Yes ☐ No ☐ N/A

Temp should be above freezing to 6°C

**USDA Regulated Soil** ( ☐ N/A, water sample)

Did samples originate in a quarantine zone within the United States: CA, NY, or SC (check maps)? ☐ Yes ☐ No

Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? ☐ Yes ☐ No

| | | | | Comments/Discrepancy: |
|---|---|---|---|---|
| Chain of Custody Present? | ☑ Yes | ☐ No | ☐ N/A | 1. |
| Samples Arrived within Hold Time? | ☑ Yes | ☐ No | ☐ N/A | 2. |
| Short Hold Time Analysis (<72 hr.)? | ☐ Yes | ☑ No | ☐ N/A | 3. |
| Rush Turn Around Time Requested? | ☑ Yes | ☐ No | ☐ N/A | 4. |
| Sufficient Volume? | ☑ Yes | ☐ No | ☐ N/A | 5. |
| Correct Containers Used? | ☑ Yes | ☐ No | ☐ N/A | 6. |
| -Pace Containers Used? | ☑ Yes | ☐ No | ☐ N/A | |
| Containers Intact? | ☑ Yes | ☐ No | ☐ N/A | 7. |
| Samples Field Filtered? | ☐ Yes | ☐ No | ☑ N/A | 8. Note if sediment is visible in the dissolved container |
| Sample Labels Match COC? | ☑ Yes | ☐ No | ☐ N/A | 9. |
| -Includes Date/Time/ID/Analysis Matrix: WW | | | | |
| All containers needing acid/base preservation have been checked? | ☑ Yes | ☐ No | ☐ N/A | 10. HNO3 pH<2; HCl pH<2; H2SO4 pH<2; NaOH pH>12; NaOH/ZnOAc pH>9 |
| All containers needing preservation are found to be in compliance with EPA recommendation? ($HNO_3$, $H_2SO_4$, HCl<2; NaOH >9 Sulfide, NaOH>12 Cyanide) | ☑ Yes | ☐ No | ☐ N/A | |
| **Exceptions**: VOA, Coliform, TOC, Oil and Grease, DRO/8015 (water) DOC,LLHg | ☑ Yes | ☐ No | ☐ N/A | |
| Samples checked for dechlorination? | ☐ Yes | ☐ No | ☑ N/A | 11. |
| Headspace in VOA Vials (>5-6mm)? | ☐ Yes | ☐ No | ☑ N/A | 12. |
| Trip Blank Present? | ☐ Yes | ☐ No | ☑ N/A | 13. |
| Trip Blank Custody Seals Present? | ☐ Yes | ☐ No | ☑ N/A | |
| Pace Trip Blank Lot # (if purchased): ____ | | | | |

**CLIENT NOTIFICATION/RESOLUTION** **Field Data Required?** ☐ Yes ☐ No

Person Contacted: ____ Date/Time: ____

Comments/Sample Discrepancy: ____

**Project Manager SCURF Review:** NMG **Date:** 9/22/16

**Project Manager SRF Review:** NMG **Date:** 9/22/16

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. Out of hold, incorrect preservative, out of temp, incorrect containers)

Pace Analytical

# CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page: 1 of 1

**Section A** — Required Client Information:

| | |
|---|---|
| Company: | Golder Associates |
| Address: | 2108 W Laburnum Ave, Ste 200 |
| | Richmond,VA 23227 |
| Email To: | Mormand@golder.com |
| Phone: 804-551-0129 | Fax: 804-358-2900 |
| Requested Due Date/TAT: | ~~24 hour~~ 3-Day |

**Section B** — Required Project Information:

| | |
|---|---|
| Report To: | Mormand@golder.com |
| Copy To: | Martha_Smith@golder.com |
| | Ron_Difrancesco@golder.com |
| Purchase Order No.: | |
| Project Name: | Bremo Weekly Process |
| Project Number: | 1520-347.220 |

**Section C** — Invoice Information:

| | |
|---|---|
| Attention: | Meagan Ormand |
| Company Name: | Golder Associates |
| Address: | gaiapdataentry_invoices@golder.com |
| Pace Quote Reference: | |
| Pace Project Manager: | |
| Pace Profile #: | |

**REGULATORY AGENCY**

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location STATE: VA

**Section D** — Required Client Information

**SAMPLE ID** (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Valid Matrix Codes: DRINKING WATER DW; WATER WT; WASTE WATER WW; PRODUCT P; SOIL/SOLID SL; OIL OL; WIPE WP; AIR AR; OTHER OT; TISSUE TS

| ITEM # | SAMPLE ID | MATRIX CODE | SAMPLE TYPE | COLLECTED COMPOSITE START DATE | COMPOSITE START TIME | COMPOSITE END/GRAB DATE | COMPOSITE END/GRAB TIME | SAMPLE TEMP AT COLLECTION | # OF CONTAINERS | Preservatives: Unpreserved | $H_2SO_4$ | $HNO_3$ | HCl | NaOH | $Na_2S_2O_3$ | Methanol | Other | Analysis Test Y/N | 200.8 - Sb, As, Cd, Cr (III) | 200.8 - Pb, Ni, Se, Zn, Cu | 200.8 - Ag, Th | 245.1 - Hg | 218.6(7) - Cr (VI) | SM4500 - Chloride | 1664B - Oil&Grease | 350.1 - Ammonia-N | SM2540D - TSS | 200.7 - Hardness | Residual Chlorine (Y/N) | Pace Project No./ Lab I.D. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | TP-160920 1735-53 | WW | G | 9/20/16 | — | 9/20/16 | 17:35 | | 10 | X | | X | X | X | | | X | | X | X | X | X | X | X | X | X | N | 92313186 |
| 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | pH analysis @ 17:42: pH 7.4 001 |
| 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

**ADDITIONAL COMMENTS**

All analyses to be performed under Golder-Pace MSA dated 12/19/2008

| RELINQUISHED BY / AFFILIATION | DATE | TIME | ACCEPTED BY / AFFILIATION | DATE | TIME | SAMPLE CONDITIONS: Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N) |
|---|---|---|---|---|---|---|---|---|---|
| (Golder) | 9/21/16 | 1330 | | 9/21/16 | 15:30 | | | | |
| | 9/21/16 | 17:00 | Rachel Burruss | 9-21-16 | 1700 | 3.6 | Y | Y | Y |

**SAMPLER NAME AND SIGNATURE**

PRINT Name of SAMPLER: L. Hamelman

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 9/20/16

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

F-ALL-Q-020rev.08, 12-Oct-2007